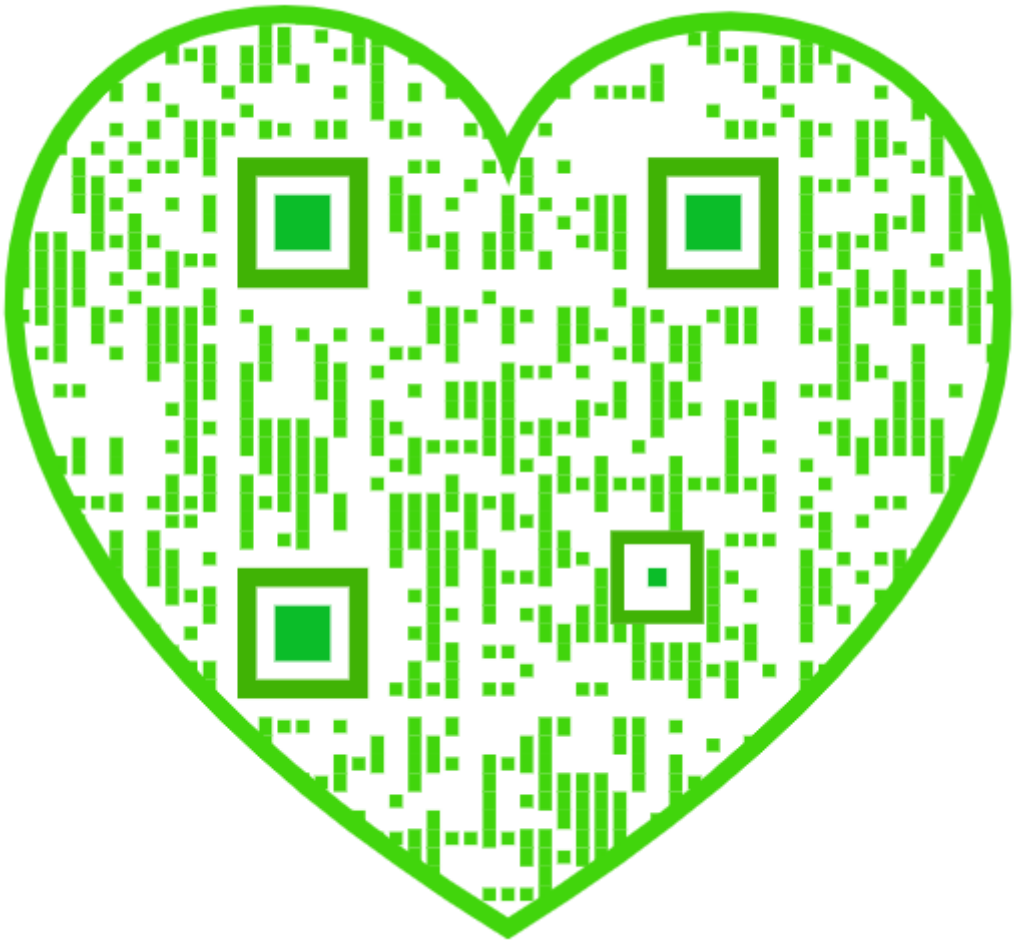

ON THE USES OF OPIUM

IN MANAGING

The Shock and Reaction

OF

SEVERE SURGICAL INJURIES.

BY

EDMUND S. F. ARNOLD, M. D.,

OF YONKERS.

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PREFACE.

The following article on the use of Opium in the management of Shock and Reaction, has been written with the hope that it will lead to such discussion as shall tend to more definite views in regard to the action of this important drug in surgical cases, equally applicable, of course, to other departments. Regarded by turns as a nervous stimulant, a pain-killer, a sedative and a narcotic, the conditions of the system under which we may avail ourselves largely of it as a remedy to accomplish either of these effects with safety and certainty, have yet to be definitely laid down. If we, in health, or active inflammatory disorders, administer Opium in frequent small doses, heat, thirst and fever are produced, or if they exist, are increased, while in large doses, congestion, narcotism and paralysis are apt to result. On the other hand, when the organic nervous system is shattered and prostrated by overwhelming pain, or by anæmiating disease, or when the patient has been brought to death's door by exhausting hœmorrhage, we find it tolerated not only in large, but even in enormous doses, with benefit, and entire freedom from unpleasant results In such cases, narcotics are not the remedies indicated, though Opium is; but is Opium to be considered in any true sense of the case as a narcotic? When the Opium drunkard is in a tremor from head to foot, when he complains of pricking sensations all over, and his nervous system is entirely unstrung, for want of his accustomed stimulus, and he takes a wineglassful of laudanum, as I have myself seen, or whatever the habitual dose may be, what is the effect? In a few minutes, half an hour at most, the eye brightens, the face flushes, tone and vigor are restored, and he feels himself again. Where is the narcotic action here? The confused accounts of the effects of Opium, and the different theories of its action on the system, are sufficient to show how uncertain is our knowledge on the subject.

I have taken the ground, that in all cases the primary action of Opium is that of a powerful nervous stimulant, acting probably through the medium of the blood on the organic nervous system, and that, in proportion as this is shattered and depressed, will it be needed, and freely and fully tolerated; in proportion, on the other hand, as the organic nervous system is up to par, or even unduly excited, will the tolerance of it be diminished, its over-stimulating effects be threatened, and thereby a tendency to congestion, nervous exhaustion and narcotism be produced. By taking the above view of the actions of Opium, I believe most of its effects on the system may be sat-

isfaetorily explained. When a person in sickness is restless and sleepless, owing to the organic nervous system being below par, and for want of its healthy influence all other nervous and general actions are irregular and disordered, an opiate will restore the former and calm the latter, and refreshing sleep is the result. The generally anæmic or plethoric state of the patient in delirium tremens, will probably have much to do with the success or non-success of opiate treatment; and again, in administering largely Opium as a remedy in puerperal peritonitis, the previous losses of blood by hœmorrhage or venesection, affecting materially, as they do [as does the general condition, in the previous case of delirium tremens,] the state of the organic nervous system, will, I apprehend, greatly influence alike the tolerance and the result.

As applied to Shock and Re-action, a thorough understanding of the action of Opium, a knowledge exactly of when and when not to employ it, is of special importance As a CONTROLLER of re-action and preventive of inflammation, its merits will be universally conceded. If the views here advocated are correct, it will be found no less valuable as a PROMOTER of re-action, in many of those terrible cases of shock, combined with exhaustive hœmorrhage, where other remedies entirely fail It is not, however, intended to recommend the use of Opium, to the exclusion of other and well-established means of restoration, nor even its employment at all, where such will succeed, or where re-action will certainly take place without it.

ON THE USES OF OPIUM

IN MANAGING

The Shock and Reaction of Severe Surgical Injuries.

In bringing forward the following paper, although it tends to open one of the most important subjects that can occupy the attention of the surgeon—namely, that of shock and reaction—I shall, from the necessity of confining myself within reasonable limits, take up but a portion of the subject.

When a limb is crushed or torn off, or a serious gunshot wound is inflicted, or, indeed, a severe injury, be it of what kind it may, occurs to any part of the body, calculated to destroy or materially to impair the vital functions of the part, the whole system sympathizes, and a general depression of the vital powers, commensurate with the seriousness of the mischief, takes place. The organic nervous system becomes temporarily paralyzed, and with it all the vital functions dependant upon its healthy influence; the surface becomes pale and cold, perhaps clammy, the circulation fails, nervous sensibility is destroyed, the whole system, in fact, is prostrated and relaxed, and the sufferer, if not in a state of actual syncope, is, nevertheless, frequently unconscious, as far as sensation is concerned, that any actual injury has befallen him. These symptoms will, of course, be modified by mental shock or loss of blood, both with regard to extent and duration.

Although I have deemed it necessary thus to say a few words by way of introduction, on the subject of the shock or collapse supervening on a dangerous injury, I do not pretend to give any full description of it; its phenomena are well known to you all.

Should the patient survive the shock of the injury, after a while, owing to the natural elasticity of the vital forces, or from restorative measures judiciously applied, returning circulation and sensibility indicate the commencement of reaction. The beat of the heart, at first weak and perhaps irregular, gradually becomes more wild and tumultuous, meeting as it does with unwonted

resistance in its attempt to propel the blood through the obstructed capillaries, the nervous sensibility becomes restored, and, gradually increasing, oversteps all healthy bounds; with it the sufferer experiences a sense of stiffness or pain soon amounting, perhaps, to agony in the injured part, and, if all this goes on unchecked, an exalted action takes place proportionate to the extent of the previous depression, and local and general irritation and fever place the patient's life in more imminent jeopardy than at first. All equilibrium is destroyed, and the already shattered vital forces easily succumb.

I now come to the important question, How should this state of things be met? Can we lay down any fixed and simple plan of treatment, by acting on which present dangers may be overcome and those ahead averted? Or, in how far must we of necessity follow developments, and be controlled by a variety of circumstances requiring vast experience to enable us to weigh them correctly, or to guide us successfully through the often appalling difficulties to be encountered? To surgeons these are all important questions, involving, as they do, not only much of the successful treatment of injuries, whether occurring in every day life or on the battle-field, but also of those inflicted for curative purposes in many of the great operations of surgery, as, for instance, in ovariotomy, the Cæsarean section, and others of like magnitude and danger. I am free to confess that I think it is, or should be, within the power of modern surgery to control from the start any ordinary reaction, however severely threatened, and I am sanguine enough to believe that, when special attention is directed to this point, much more will be done than has hitherto been accomplished.

When the nose or ears of an individual are frozen by exposure to intense cold, experience has taught us to use friction with snow or ice-water until the vitality of the part is restored. We are not afraid that the fresh application of cold will add to the injury already inflicted by it; on the contrary, we gladly avail ourselves of its sedative effects to keep down too sudden reaction, and thus, under the influence of friction, to favor a return of the part to its normal condition so gradually that it shall not run beyond healthy bounds, and if we have a sufficiently early opportunity of putting it in practice, the danger is quickly over-

come. This affords us the principle by which we ought to be guided when the whole system is stricken down by the shock of sudden injury. After pursuing successfully measures to bring about reaction, we ought, from the very first moment of its occurrence, to be prepared to combat it by meeting, not following, its development, and thus endeavor effectually to obtain the mastery over it from the start. If, in the case of a frozen member, instead of following the above practice, we were to take the sufferer into a warm room, and there await reaction before commencing our treatment, such reaction would probably be so sudden and violent that it would make headway calculated to cause destruction, or, at least, permanent injury to the organ before we could control it. Here, with but a small part involved, and the general strength unimpaired, the energies of the whole will be called into play to promote reaction, which will be proportionately violent; hence, we must even anticipate its commencement. When, however, the entire system is prostrated, and the general nervous energy crushed by the shock of a severe injury, the rebound is less sudden, and we need not interfere, dare not, perhaps, otherwise than with restoratives, until it actually commences; but then it will progress with strides becoming more and more rapid, so that, unless we take our measures from the very beginning, it will soon get beyond us, and I think I shall be able to show that, while we have one remedy, at least, of inestimable value to us at the commencement, the same becomes more inapplicable and even injurious in proportion to the height reaction has reached. I believe, from want of some definite rule of action, the error is too frequently committed of not seizing the critical moment, and, by awaiting thorough reaction, giving it a fatal start. During the continuance of shock, the whole nervous system is oppressed, and I think it should be laid down as a leading principle, that, simultaneously with measures promotive of such reaction, such oppression should be sufficiently maintained, so as to be removed only by very slow degrees, and thus, by allowing the system to gradually recover its natural elasticity, all danger may be frequently averted in a few days. This must be accomplished by a combination of stimulating and sedative influences, so balanced as, on the one hand not unduly to hasten restoration, on the other not to risk utterly prostrating the as yet

feeble vital forces. Such a combination I believe we possess in Opium.

So many and apparently opposite uses have been made of this invaluable drug, so many different actions have been ascribed to it, and its preparations have often been so indiscriminately employed, that if a number of medical men were separately asked to state its most prominent qualities briefly, there would be very different answers given. Hence I will ask to be allowed to dwell a little upon such at least of its properties as are applicable to my purpose, and shall attempt to show that its stimulant qualities are not less prominent than those of a sedative character—that, although in a certain sense a valuable antiphlogistic, it tends to produce fever, congestion and narcotism, when the proper conditions for its employment are not observed—that when the body is prostrated by anæmiating disease or intense pain, the tolerance of the drug may become so increased that the quantity requisite to exert a beneficial effect, shall be sufficient to constitute a deadly poison to the healthy person (in this it differs from most other drugs)—and finally, that in lesions of a truly desperate character supervening upon prostrating disease previously existing, it has proved a sheet anchor in the hands of the intelligent physician, and consequently, is not less available to the surgeon in analogous conditions, however differently induced.

"Opium," says Stille, "is a very complex substance, contain-
"ing among other constituents, morphia 10 to 12 per cent., nar-
"cotin 6 to 7, codein 0, 6, thebaina 1, besides narcein, meconin,
" meconic acid, extractive, mucilage, &c." The sedative virtues reside mainly, as we know, in the morphia, the stimulant probably in the thebaina, which, according to Majendie is closely analogous to strychnia and brucia in its action upon the system. "Codeia," Stille farther observes, "is also said to be a nervous
"stimulant without narcotic properties, or at least without any,
"except in very large doses. This statement lacks confirmation.
"The other constituents are comparatively inert."

Mr. Frederick Skey, of Bartholomew's Hospital, remarks that
" as a stimulant, opium is not very often employed in practice,
" while its properties as a sedative are in daily requisition, and
"so completely is its action associated with this sedative princi-

" ple that its occasional influence as a stimulant is almost entirely " lost sight of, and the stimulating property is merged in the " supposed sedative." Farther on he says: " In truth opium is " a most valuable stimulant of the vital powers—that there is " no drug simple or composite known to our pharmacologists, " that possesses an equal power with opium of giving energy to " the capillary system of arteries, of promoting animal warmth, " and thus maintaining an equable balance of the circulation " throughout the body." Availing himself of this stimulating property, he has found the treatment of indolent ulcerations of old people as well as of gaugrena senilis by opium administered in small doses, twice or thrice daily, wonderfully efficacious. As another instance of its reviving and stimulating powers he says, that in traveling on a cold December night and having forgotten his overcoat, he suffered much from the cold. After long exposure he obtained, while the horses were being changed, a draught containing twenty-five drops of laudanum at a druggist's shop. He had still ten miles to ride and adds: " I believe " I was the only person outside the coach that night, who did " not suffer the slightest sensation from cold." I have frequently observed myself, that when in chronic dysentery opium has been administered in small doses, and frequently repeated for any length of time, a hot skin and full pulse, and a state of excitement bordering on delirium have been produced, so that the remedy had to be abandoned.

How then is opium an antiphlogistic? To quote once more from Mr. Skey's excellent article: " The benefit derived from " opium when administered for the purpose of arresting inflam- " matory action of the vessels, admits, I think, of much doubt, " and should be resorted to with some hesitation as a remedial " agent, though I am quite persuaded that the evil of its admin- " istration is greatly overrated. But who will profess ignorance " in these days of the inestimable value of this agent, when re- " sorted to immediately after an attack of inflammation has been " subdued by a local or general bleeding? Here we can imagine " that the activity of the disease being checked, the diffusing " influence of opium upon the circulation may act as a simple " derivative, operating on the vessels at the moment they are " not indisposed to yield up their blood, and to which indeed

"they are compelled by the diffusive power of the general stim-"ulus." Dr. Elliotson strongly recommends opium in a full dose of two or three grains after venesection to syncope, as producing a soothing and beneficial effect. Where too much blood has been lost, either from injudicious bleeding or from excessive uterine hœmorrhage, he regards opium as the chief remedy. The late Prof. Lever, of Guys, also insists strongly on its value after prostrating uterine hœmorrhage. Dr. Christison, of Edinburgh, speaks highly of the use of opium in acute internal inflammations, as rheumatism and peritonitis, after free blood letting. Dr. Watson also extols its value as an antiphlogistic in peritonitis after bleeding.

From all this we gather that opium does not really subdue inflammation. It must, where it exists, be subdued by other means, and the opium then exhibited as a preventive against its recurrence. In its virtue then as a preventive, not as a subduer of inflammation, lies the peculiar advantage of administering it freely immediately after the performance of any of the great operations of surgery, and keeping the patient under its influence until the danger of inflammation arising is past. It then both rouses the energies of the prostrated system, restores and controls the circulation, soothes pain and irritation, and thus places the patient in the best possible condition for recovery as well as for the exertion of the necessary reparative powers.

We may reasonably infer also, that if opium acts so beneficially in restoring the energies and preventing subsequent inflamation, when the system is prostrated by syncope from venesection, or by severe uterine hœmorrhage, that it is equally indicated after exhaustive bleeding resulting from surgical injuries.

I should farther arrive at the conclusion, that the foregoing shows a certain reduced, debilitated or exsanguine state to be a necessary condition for the safe and proper administration of the drug in full doses, and that in proportion as reaction or inflammation have actually advanced, we shall, bearing in mind its stimulant properties, need to be more careful, lest its dangerous effects be developed.

The above conclusions presuppose the use of opium itself, and consequently of its stimulant and sedative qualities combined. Of the latter I have not yet spoken. Dr. Elliotson quotes some

experiments of Dr. W. Philip, who applied to a denuded brain a small quantity of opium, and on looking at the distant capillary vessels in the extremities, he found them very much excited, but if he applied a large portion he found the action diminished; just the opposite effect. So it is when we give large and small doses. "Repeated small doses," he says, "create heat, thirst and fever, whereas a considerable quantity produces the reverse; hence if you want its sedative effects it should be given in one full dose. This," he adds, "would be dangerous if you did not bleed, but it is perfectly safe if you have depleted the patient copiously in the first instance." It must be remembered that in severe accidents, the bleeding is done for us beforehand frequently by the hœmorrhage attending the injury, or that the energies are otherwise reduced to the point reached by bleeding from the severity of the shock. Stille also says that as a general rule "a full dose of opium renders the action of the heart stronger and more frequent in the first instance," (hence the danger of its administration when inflammation actually exists); "subsequently, however, it reduces the frequency without diminishing the volume of pulse." Excellent qualities these for our purpose.

It seems then that we can produce either a stimulating or sedative effect according to the larger or smaller doses in which we employ it, the stimulating effect predominating when small doses are given; on the other hand, when a large dose is administered, we seem to step away over the stimulating stage, (always presupposing the system is in a condition to be tolerant of the drug) and to produce an almost direct sedative action. A familiar illustration of this is afforded in the old fashioned practice of treating delirium tremens by opium. Here, although we have high febrile excitement, the powers of life are really greatly prostrated. By giving a drachm or two of laudanum in a little brandy, or any other accustomed drink, the system is brought up to par, the restless excitement subdued, and refreshing sleep induced, the patient often awaking well the next day. We have here a condition establishing a tolerance of the drug; were we to try the same treatment in fever of a really inflammatory character, we should go far to poison our patient.

It would be foreign to the present article to enter upon the

effects of opium upon the healthy system farther than to direct attention to its stimulating effects upon the opium drunkard, to the congested condition of the brain and narcotism produced by it in over doses, and to the resemblances between its action in these respects and that of alcoholic liquors both in health and disease, a priori with such powerful agents, one might suppose that with prostrated energies the system would be less able to resist their influence and more readily to succumb; whereas we find the reverse the case, and I do not know how it can be otherwise explained, than by supposing that the narcotism arises from exhaustion and congestion resulting from over stimulation, and that the tolerance of the remedy is increased in proportion as the system is reduced to a condition removing it from the liability to congestion and rendering its stimulating and diffusive effects necessary. Where sleeplessness and fever are induced by a small portion and still worse effects by larger quantities in a healthy person, let the same individual be reduced to an exsanguine condition and prostrated by the effects of disease or severe injury, and large doses will be borne not only with impunity, but with actual benefit, and entire immunity from all unpleasant symptoms. During the cholera season of 1849, I was called upon to attend a person long affected with disease of the liver, and also of the lungs, who had been attacked with dysentery, and who did not send for me until she had been trying various domestic remedies for more than a week. Previously feeble, she had become of course much reduced below even her ordinary poor standard of health. Although having no hopes of a favorable issue, I determined to leave nothing undone, and finding all my remedies of no avail, I called in successively in consultation two able practitioners, with no better results. Finally I sent for Dr. Dickson, then at the University, who expressed the opinion that there was too much organic disease called into activity to look for recovery; but thought that if anything would benefit her it would be opium in 5 or 6 grain doses, three or four times in the twenty-four hours. From this time forward she took 24 grains in the 24 hours for a period of three weeks, at the end of which time she died. During the first fortnight she rallied up, the skin became warm and moist, the pulse fuller and more normal, she slept well and quietly at

night, had but two evacuations daily, remained entirely free from headache or any unpleasant effects of opium, and were it not for the fœtid and diseased character of the evacuations, restoration to health might have been predicted. During the first fortnight she was kept, as it were, in an artificially normal and equable condition, never flagging except when an attempt was made to diminish or withdraw the remedy. At the commencement of the third week dyspnœa set in, I presume from passive congestion in lungs, already in part hepatised, and she began to sink. I select the case of this poor broken down and worn out creature, in preference to others terminating more favorably, as illustrating, I think in a remarkable manner, first the reviving, and secondly the sustaining and controlling powers of opium, and I also think, from all the evidence I have thus far adduced as to its action, that if not placed in a position by itself, as a compound substance in the Materia Medica, it nevertheless belongs rather to the class of nervous stimulants and tonics than among the narcotics, and that when we so regard it, we take the first step towards understanding its great value in desperate surgical injuries, as well as the conditions under which we can safely employ it.

When reaction is setting in, it is in most instances accompanied by a sensation of pain in the injured part, and although the former precedes the latter, still there is so slight an interval between the two, that for all practical purposes they may be regarded as simultaneous. There is too a class of cases, where perhaps the injury is not so great in itself, and where symptoms of reaction soon manifest themselves, but where with it, owing to the highly organized or sensitive nature of the part affected, the pain is so intense and overwhelming, that the farther progress of reaction becomes, as it were, arrested, the skin remaining cold, and bedewed with heavy drops of perspiration, and, if help is not soon afforded, what little remains of vital energy becomes quickly exhausted, and the patient will sink, or the case may otherwise terminate fatally from the irritative fever that sooner or later sets in. In such cases we can, fortunately, avail ourselves of a very valuable quality of opium, viz: as Stelle expresses it: "Of the extraordinary manner in which "pain modifies the influence of opiate medicines; to such an ex-

"tent indeed, that doses which would in health prove fatal, are "not only unproductive of harm, but as in some cases of tetanus, "and of biliary or nephritic colic, may fail to make any impres- "sion whatever." I apprehend, however, that the condition of the system as regards vigor, must be taken into consideration here also. We should no more dare to give opium largely without reference to this, in surgical injuries, than we should to administer it in painful inflammatory diseases without previous bloodletting. If either by bloodletting or from the nature of the injury itself the system has been reduced to a point at which a full tolerance of the drug is established, then taking the alleviation of pain as our guide, I believe it may be administered to any extent necessary to accomplish that object, with the effect not only of calming and soothing, but also of preventing inflammation, and thereby contributing to the recovery of the patient.

For the following very interesting case in illustration of the above, I am indebted to Dr. Robert Nelson, who writes as follows: "About 1820, Major O. S. was wounded in a duel by a "ball, 20 to the ounce. It struck the posterior third of the "crest of the right ilium, fractured that bone, and entered the "body of the last lumbar vertebra, where it was found some "eighteen years after. When hit he fell to the ground and in- "stinctively grasped at his privates, believing that the scrotum "was shot away, but felt no pain in the real course of the ball. "He trembled from pain, like in a severe ague. On that occa- "sion I attended him in my capacity of assistant surgeon, had "him carried home, and sent for my superior, Kennelly, a gar- "rison surgeon, and the surgeon-in-chief, Grassett. By orders "I bled him to 50 oz., and gave him ten grains of Dover's "powder, and used the catheter the same day. On the third "day I was left in charge of him for that night, with orders to "give him an anodyne of 40 drops Tr. Op. and nitrous ether, "at 8 P. M.; to repeat the draught, and bleed again during the "night, according to urgency. Such agony as this man suffered "I had never before seen (nor since). His bedstead trembled "with his body, he breathed and spoke through his teeth, and "perspired so as to wet through a hair mattrass. At 8 P. M. I "gave the draught without effect. He exhorted for relief of

"any kind, even called for death. Having already given "drachm doses, in cases where I was under no obligation to "superiors, I now ventured, in pity, to disobey my orders and "gave him 2 dr. Tr. Op. After half an hour, finding no per cep- "tible effect from that dose, (opium, when official manifests its "first impression in half an hour), and fearing the loss of its "potency if not quickly supported, I gave him 3 dr. more, and "waited nearly an hour for an effect, but none came. At this "time the patient and his friends became clamorous, and insisted "upon a persistence in the remedy if it killed him, so great was "his agony. I then gave him a whole ounce at a draught, "which he drank down pure. In half an hour more both the "patient and bedstead trembled less than heretofore, he was "evidently easier, and in fifteen minutes more—that is three- "quarters of an hour after the last dose—he slumbered slightly, "and the perspiration diminished. At 12 the pain began to re- "new itself, and then I gave him half an ounce more, with the "same result as from the last dose. For the same reason he "took, between 3 and 4 A. M., another half ounce. This time "he got into a good sound sleep and a total arrest of the tremb- "ling.

"Briefly. On the evening of the 3d day Maj. O. S. took

"at	8 P. M., 40 drops Tr. Op.,	
"at	9 P. M., 2 dr.	"
"at	9¾ P. M., 3 dr.	"
"at	10½ P. M., 1 oz.	" He slumbered slightly now, but pain returning.
"Resumed	12 P. M., ½ oz	" Slumbered again.
"Between 3 and 4 A. M.,	½ oz.	" and now he got good sound sleep for more than 2 hours.

"The quantity of Tr. Op. taken with "impunity and benefit from 8 P. M., to "4 A. M., in all 8 hours, } 21½ drachms.

"At 8 A. M. the surgeons came and were pleased to find him "easy; but when I showed them the memorandum of what took "place during the night, the first exclamation was—you never "gave such doses—the next was, how dared you go beyond your "orders, etc., etc. But the surgeon-in-chief took me aside to "be assured of the truth of my report, which was proved by

"the quantity diminished in the bottle, and the statements of "those who passed the night with the patient, and urged me to "what I did. The surgeons discussed energetically how it hap- "pened that the opium did not poison. I ventured to say '*pain* "*had eat the opium ;*' this caused a contemptuous laugh, and "I was left without further censure. From that time forward "the patient took half an ounce of laudanum at a dose, two or "three times in the 24 hours, with good effect, producing and "leaving behind no other opium symptoms than those of a mod- "erate anodyne, as in ordinary cases of sickness. The patient "gradually improved, and the opium was gradually diminished, "until in a couple of weeks the dose was reduced to 2 drs."

"At this time a theory prevailed that opium was a stimulant, "and of course not to be given in fevers or inflammations; that "it was merely a placebo that marked a disease for the time be- "ing. This belief prevailed, and was strictly adhered to in the "army at least."

"Shortly after the injury his urine became highly ammoniacal, "and had to be drawn off for a month. From the first moment "he suffered complete paralysis of sensation in the left thigh, leg "and scrotum, from which he never recovered; but there was "*no* paralysis of motion. Many curious physiological pheno- "mena occurred in this case not relevant to the opium point. But "one may be mentioned—the paralysed limb was incapable of "bearing the same degrees of heat and cold without accident as "did the right and sound limb. Once he put both feet into a "pail of warm (rather hot) water to bathe them. The right "well foot resisted the heat as usual, but the left one was scald- "ed and blistered, and took a long time to heal. At another "time, while asleep in bed, his left foot protrnded from the cover- "ing without his knowing it, as he had no sensation in it. Al- "though the room was barely cold, the fire having gone out dur- "ing the night, his great and little toes were frosted; they "blistered, and the nails came off. Healing was protracted."

"Since that time, having entered civil practice, I have given "3 dr. doses Tr. opu. in the severe form of enteritis, and in puerpe- "ral peritonitis, where large bleedings often failed to relieve "and cure. But I do not wish it believed that I am an '*opium*

"*Doctor;*" quite the contrary. Large doses are useful *only in* "*cases of great pain*—such as scalds, etc."—R. NELSON.

In the foregoing case we have the conditions necessary to establish full tolerance of opium, viz., a system reduced by copious bleeding and shattered by the severe and exhausting pain of a terrible injury involving both sensitive and organic nerves. Had the directions of the Doctor's superiors been carried out, the patient would in all probability have perished miserably, without a suspicion crossing the mind of anybody that anything in the power of surgical science to accomplish had been left undone. He would have died secundum artem.

We find also in the above case that it was necessary to repeat the opiate in full doses in order to keep the pain subdued, and such will frequently be necessary; but many instances will occur where the pain, being once effectually subdued by opium, will not return, although, of course, the lesion that causes it remains. Before the soothing effect of the drug has worn off, the system seems, as it were, to have become reconciled to the injury. Some years ago, I was called upon to attend in Yonkers a lady in her second confinement. Her first, she informed me, had been very severe and protracted, and as she had not been able to retain her fœces subsequently, I concluded (not being allowed to examine) that the perineum and sphincter had been lacerated; that there had been more or less ulceration from that time forward; and that there were sore surfaces to be stretched and cicatrices to be torn asunder. She greatly dreaded the approaching event, and said: "Doctor, I am sure, from the condition I am in, I shall suffer dreadfully with after pains, and you must do all you can to relieve me; but I cannot take opiates; they make me perfectly crazy." I told her, of course I would do all I could for her, but must be allowed to follow my own judgment as circumstances dictated. She was delivered of a rather large child, and within half an hour was rolling from one side of the bed to the other in perfect agony, so that I momentarily dreaded severe hœmorrhage; accordingly, did not take long to consider the course to be pursued. I determined, if possible, to step beyond the stimulant effects, and administered a teaspoonful of full strength laudanum in half a wine-glassful of sweetened water. Not the slightest effect having been pro-

duced by it, in half an hour I gave another. In about twenty minutes she remarked, "I begin to feel as if I were in heaven," and soon fell into a calm sleep. Finding her pulse natural and her skin warm and moist, I left, with directions to the nurse and husband not to mind her dreaming wildly in her sleep, but to send for me if any change took place in her general condition. The following morning she awoke free from headache and pain alike, nor did it return, and I do not think I had occasion to prescribe a dose of anything, save once a little oil, from that time forward until I discontinued my visits, some three weeks later. In this case, the shock and exhaustion of five hours' parturient effort, together with the moderate bleeding accompanying delivery, had been sufficient to secure a tolerance of the drug, and never did a remedy act more benignly.

In view of the above cases, may we not infer that, when, by shock, or hœmorrhage, or venesection, the necessary tolerance of opium has been established, we may take the alleviation of pain as a safe guide for the extent to which it may be administered, giving it to any amount necessary to relieve pain, and no more, the cessation of the latter being evidence that the system has been thoroughly brought under its sedative influence?

I now go on to another class of cases where there is but little pain and small hopes of any natural reaction—I mean to those terrible accidents, where, although no vital part is involved, the injury is, nevertheless, very severe, and the powers of life have been so lowered by excessive hœmorrhage that the unfortunate victim of casualty is momentarily threatened with death. What is to be done then? I believe there is sufficient evidence to prove that opium is still our best remedy. Combine it, if you will, with others, but even without them, it will effect more than all of them combined. True, we cannot avail ourselves of its sedative powers here, but we may of its stimulant, of its reviving and sustaining properties. In an article on the uses of opium in Midwifery, (Braithwaite No. 21, p. 307,) Dr. Lever, after speaking of its acting like a charm, while stimulants are administered with judgment, in the anæmic form of convulsions, associated as they are, not unfrequently, with large losses of blood, goes on farther to speak, and I shall now quote him verbatim, of the efficacy of opium in the treatment of those grave

cases where the uterus or vagina is lacerated, or the bladder or diaphragm has ruptured. "The two latter lesions," he says, "are indeed to be regarded as all but hopeless, but not the for- "mer, for I have seen cases treated by administration of full "doses of opium, and then repeated at varying intervals for seve- "ral days, and then terminating successfully. To one woman I "was called, where there was a band in the vagina, the result "of a previous delivery; in this case, the laceration was so ex- "tensive that the hand could be passed into the abdomen. Al- "though the patient appeared to be dying, although the last "rites of the church were administered to her, she rallied, re- "covered and is still alive. But the value of opium is most em- "phatically demonstrated when exhibited after floodings. In "these cases, where, to use the graphic language of Dr. W. "Griffin—'where the countenance is sunk, the eye hollow and "'glassy, the lips blanched, the skin cold, and the whole person "'corpse-like; where the pulse is almost gone at the wrist; "'where the beat of the heart is scarcely perceptible, and stim- "'ulants, even brandy, are vomited or useless, opium will act "'like magic, and save the patient from an untimely grave; but "'to do good, it must be exhibited in full doses of one or two "'drachms of the tincture, or three or four grains, repeating two "'grains every half hour, until the pulse becomes distinct, the "'breathing calm and the jactitation allayed.' No man of much "obstetric experience will deny its value under the circumstan- "ces thus detailed. I could illustrate its efficiency by the reci- "tal of several cases of success, where a patient appeared to be "on the very confines of eternity; and in the subsequent consti- "tutional treatment its exhibition must not be forgotten; it will "lessen exhaustion, diminish restlessness, allay vomiting, calm "gloomy forebodings and procure sleep." So far with Dr. Le- ver. In such cases as he describes, it is not the sedative or nar- cotic properties that are called into play; what we need and what we have is, in the first instance, a powerful nervous stimu- lant and tonic, both reviving and supporting the powers of life, followed later by the sedative effect of the drug, whereby undue excitement is allayed and the system kept in a calm and quiet condition. Do not these cases show that we can rely quite as much upon opium for its rousing and stimulating effects, when

needed, as we can at a later period on its sedative action for allaying pain and preventing inflammation? If, in the hands of the obstetric physician, such results can be obtained by the free use of opium, what sound reason can be given why the surgeon should accomplish less by means of the same agent, when brought face to face with some of those terrible injuries, especially with hœmorrhage, differing only in the mode by which they are inflicted, not in degree, nor in the analogous conditions of the system they induce?

All the facts I have brought before you, go then, I think, incontestibly to prove that in the hands of the surgeon opium is one of the most valuable agents we possess, and that it is precisely, during collapse or when reaction is just setting in, that its virtues are most available. Whether that condition be induced by any of the ordinary accidents of life, by wounds on the battle field, by the shock of severe surgical operations, by free or too copious venesection, or in obstetric practice by severe hœmorrhages, for in all these the system is brought down to, or even below the starting point of reaction, it will, as we have seen, by its nicely blended stimulant and sedative qualities, rouse the nervous energies, restore the pulse, free the capillary circulation, then control abnormal action, soothe the pain, allay constitutional irritation and prevent inflammation. This beneficent action covers not only the most important period of time in the history of the case, but will materially influence the whole after progress of it. I speak of the phenomena of shock and reaction as being similar in essentials in all cases, as making a condition per se, and as differing only in intensity or duration, proportioned to the severity of the injury causing them. The shock in all cases, a morbid impression made on the organic nervous system, temporarily so depressing it, as to paralyse its functions, and with it the vital actions depending upon its healthy influence, thereby extending its effects to the entire system. Reaction, the recoil or rebound from this state, whereby action is not only restored, but passes beyond healthy bounds, and in proportion to the previously unnatural depression, becomes unduly exalted, as manifested by fever and constitutional irritation. We need reaction, and it is in itself a healthy process; it is its excess only we have to dread. If a very trifling injury occurs, such as

a cut of the finger, the system will be hardly sensible, either of the shock or the recoil, yet an excited action is set up at the part and marks the commencement and progress of reparation; and I think it is easy to believe that when the injury is more severe, whether from its extent or from the sensitive or vital nature of the parts involved, that the action so set up shall be, proportionately to the shock and subsequent general reaction, so intensified as not only to exceed healthy bounds, and pass into inflammation, but almost from the moment it does so even to threaten disintegration and destruction or death in parts rendered less capable of resisting by their lacerated or otherwise enfeebled condition; nay more, that the amount of reaction necessary to do mischief may be proportionally less, as the lesion is more severe; hence the importance of securing control of the reaction from its very commencement. If we can but get the mastery of the latter from the start, I believe we can maintain it, thereby diminishing or avoiding the dangers of inflammation. Thus the inflammatory condition may be regarded rather as a sequel or consequence of reaction than as a part of it, although inflammation is nothing more than a reaction going on beyond the bounds necessary for reparation, or in other words a morbid excess of it locally.

In proportion then, as we can succeed in lifting the patien over the shock and keeping down the reaction within healthy limits, will the dangerous consequences of the latter be avoided, and nature will go quietly to work to repair the injury, the system becoming daily less sensitive and more reconciled to its altered condition, until perhaps, in a few days all danger is past. Suppose for instance a bullet be lodged in the body, which cannot be found, and the inflammation produced by it be overcome, or still better prevented, the system will soon become reconciled to its presence, cease to notice it as it were, perhaps encyst it, and there it may lie for years without causing any disturbance, provided it does not mechanically interfere with any of the actions or functions of the body.

Let on the other hand the reaction go on unchecked to a certain point, and pain and inflammation with constitutional irritation and fever will set in. The local excitement, which acting in moderation favors and promotes reparation, when carried to

excess, becomes disorganising and destructive, threatening loss of limb, and if a vital organ is involved, loss of life. This is the more difficult to manage, because we cannot in the yet weakened and exhausted condition of the general system, resort to those active measures we should adopt in ordinary inflammations, and moreover it may be necessary to husband all the patient's powers, while endeavoring to control excessive local action, in order to enable him to go through the subsequent sloughing and tedious reparative processes with safety. These latter alone will probably, when they have once set in in a healthy manner, be sufficient to prevent unduly exalted action, and on the contrary we shall often be obliged to give the most nutritious food with porter, wine or brandy to keep the powers up to par.

Again, as reaction advances, we seem proportionately to lose the benefit of our sheet-anchor, opium, inasmuch as vigor is restored, the danger of over stimulation and narcotism are increased by its free use. We must therefore, then, fall back upon other remedies, although preparations of opium, from which the stimulant properties have been removed—such as McMunn's Elixir, Majendie's Solution, etc.—may be often combined with them advantageously, requiring, however, great care and judgment in their administration, lest, in avoiding the Scylla of overstimulation, we fall into the Charybdis of narcotism. Where the state of the patient admits of free venesection, we may, however, still adhere to the pure opium precisely as in ordinary and inflammatory diseases.

To apply the above to actual treatment: I am not aware that surgeons, have availed themselves much of the stimulating properties of opium in the worst cases of collapse, where, in addition to a terribly severe injury, the patient has been reduced to almost the last gasp by concomitant hœmorrhage, and where warmth, friction and diffusible stimuli failing, he is momentarily threatened with death; yet, from the evidence I have produced, there is reason to believe that opium in full doses may yet rescue such from the brink of the grave. I would not apply such treatment to those minor cases, where reaction will certainly set in, either unaided or by the ordinary methods. When, however, reaction is setting in, as indicated by returning sensation and pain, then (regard being had to the amount of previous

hœmorrhage) I should be prepared to administer laudanum to the extent of one or two drachms half hourly, or solid opium in two to four grain doses, carrying it to the extent of relieving pain and no farther, and preceding its use by venesection or not, according to the general strength of the patient. When the full sedative effect is established, little more is needed beyond keeping the patient on a bland spoon diet, and repeating the dose with the reappearance of pain. This in general will not be required more than twice or thrice within twenty-four hours. As we proceed, the intervals at which this will be necesssary will be prolonged, and in a few days, at most, the dangers of reaction will be over. The phases the case may assume, according to the nature of the lesion, will indicate the farther course to be pursued on well-established principles. It merges then from the general treatment of reaction into the special treatment of a particular lesion. When Dr. O'Reilly, in his paper, recommends, after the operation for strangulated hernia, that the patient should be put under the influence of opium and kept so for several days, an illustration of this kind of treatment is afforded. Equally so, when Dr. Krackowitzer says that he does not fear, and uses accordingly, opium, after the operation for harelip in children. The worst case of complicated injuries I ever attended was that of the boy Whitefield, alluded to in a a pamphlet of mine on other matters. As this case has never been published, and affords a striking illustration of the advantages of the opiate treatment of reaction, I may be pardoned for stating a few of the particulars connected with it here. On the 14th of October, 1857, the lad in question (a boy of quick, nervous temperament), aged 11 years, played truant from school, and wishing to get to the city without paying, crept unobserved into the baggage car of the down morning express train, which does not stop below Yonkers. On passing through Forrest's Cut, about a mile and a quarter from the village (by which time the train must have got under pretty full headway), seeing the conductor approaching, he was probably seized with a sudden fright, and jumped off the platform against the rocks, whence he must have rebounded either against or under the cars. He was picked up, as supposed, in a dying condition, and as an up train was approaching, taken back to Yonkers and carried to

his home, where I saw him about half an hour after the accident had occurred. His injuries were as follows: The lower half of the left leg and entire foot crushed into a shapeless mass, and in part torn away; the left thigh fractured at the lower third, a spicula of the upper fragment resting against and raising the skin, so that a little awkward handling, or even the pressure of the finger, might have easily converted it into a compound fracture; the right leg, as he lay on the bed, was somewhat flexed, and rested on its outer side, with tibia and fibula both broken and projecting out at the middle of the leg, while the toes hung directly to the ground; there was also compound fracture of the great toe, and it would seem as if something heavy had passed over the foot, the boot being torn, and the vitality of the skin so destroyed that in a few days it sloughed off nearly all along the base of the toes; finally there was a pretty clean cut to the bone, between three and four inches in length along the vertere, in the course of the longitudinal sinews—five severe injuries in all, in addition to the violence to the general system necessary to produce such terrible results. There can be no question as to the gravity of this case. The sufferer was conscious, did not complain of pain, and remarked to his mother: "Don't cry, mother; I shall get well." Having summoned two other physicians to my assistance, chloroform was administered and amputation at once performed below the knee, on the left side. I may here observe, that in a subsequent conversation with Dr. Carnochan on this subject, he strongly insisted upon the propriety of primary amputation in such cases, on the following grounds: 1st. That sensibility is so blunted, that little or no additional shock is inflicted—so little, indeed, that we might probably even dispense altogether with the use of chloroform. 2ndly. That a second shock after reaction is thereby avoided. And 3rdly. By affording clean cut surfaces in opposition, the reparative process will at once commence with returning reaction. To return. The patient was removed to bed, the limbs laid in as comfortable a position as possible, supported by pillows, and some wine and water administered. I now took sole charge. He rallied soon, and began to complain of pain all over, which was at once allayed by a teaspoonful of laudanum. I now left, with directions to the mother to repeat the laudanum as often as

necessary to subdue pain. He remained pretty comfortable for nearly twelve hours, the pulse not rising above 100 ; dozed much of the time, and took very little nourishment. At the end of this period he began to grow wild and restless, and to complain of severe pain, when the laudanum was repeated with a like happy result. As soon as I could procure the needful materials, I put up the limbs in the following manner: I had a triangular splint of three pieces made, fitted in length to the sound thigh, and consisting of a horizontal portion to rest on the bed, an upper inclined piece for the thigh to rest on and so as to raise the knee about eight inches, and a perpendicular connecting piece. The thigh piece was bevelled off at the ends, well padded and provided with three straps and buckles to secure top and side splints which were superadded, and the whole enveloped in a bandage. This kept up extension and enabled me to attend, either to the stump or fracture, without any interference, one with the other. For the opposite leg I obtained a McIntyre splint, and raising the thigh piece so as to bring the knee about the same height as the other, fixed the leg piece in a horizonal position by a block fixed under the heel. The bandages were so arranged that the wounds could be attended to without disturbing them. Dressings of laudanum and water, and subsequently of chamomile tea were employed. By the third day healthy granulations began to show themselves. The discharges, as suppuration set in, were of course very copious. He required, for the first four or five days, a teaspoonful of laudanum about twice in the twenty-four hours, after which the opiate was gradually withdrawn and wine, brandy, milk punch, beef-tea, arrow root, &c. substituted. During the above period the skin was mostly moist, the pulse not ranging above 100, except once when it rose to 110; he was calm and almost free from pain, and slept much, but did not exhibit a trace of any of the ill effects of opium. By the end of the week I began to entertain hopes of his recovery, and from this time forward he never had another symptom calculated to excite alarm. On the 11th of January, within three months, I paid my last regular visit.

Now was this merely a fortuitous result, or was it owing to the fact that he had been treated on the principles I am now advocating? As regards the first, I candidly admit that I did not

treat him upon any such principle, that I did all I could to make him comfortable and to alleviate suffering, looking forward to his sinking shortly as a certainty. Subsequent reflection and experience, as well as other evidences, such as I have this evening laid before you, have gone far to convince me that the result was not one of chance, and that in a similar case, provided the first shock was survived, like treatment would result in corresponding success.

Of course, when important blood-vessels are torn and uncontrollable hœmorrhage takes place, we cannot expect benefit, neither can we by such treatment save the sufferer from the effects of a mortal wound. But what constitutes a necessarily mortal injury, and how can we always certainly know that such has occurred? Miller says: "If the depression be great and protracted, the "prognosis is unfavorable, the inference being that the wound "has reached a vital part." There is nothing very definite about this, and if we have no better guide, it only goes to show how difficult it is to draw the line of demarkation between what shall and what shall not necessarily prove a mortal injury. For instance, if a bayonet were run through a man's abdomen, important and vital parts could hardly fail to be injured, yet I recollect in the late Mr. Morgan's surgical lectures at Guy's Hospital, he annually related a case that occurred during the French War in Canada. A British outpost being attacked by a superior force, had to retire. In the retreat, one of the men was bayonetted through the abdomen, and falling on the stump of a tree, the point of the weapon entered deeply into the wood. Reinforcements being at hand, the French had, in return, to run; and as the bayonet in the hurry could not be withdrawn, the owner had to unfix it from his musket, leaving the man impaled. He was carried to the rear, as was supposed, to die. To the surprise of all the surgeons he recovered without any bad symptoms, and was shortly again on duty. Likely enough from the supposed hopelessness of his case opium was freely administered to relieve his sufferings. Mr. Maiden's case, where the shaft of a wagon was run through a man's body, furnishes another instance of recovery, from what could not be considered other than a mortal wound. A bullet in the heart would usually be considered mortal; yet we recollect in the Poole Inquest, a case was cited

where a bullet had been lodged and encysted in the heart for years, and cases of recovery have been recorded where mortal injury had occurred to one or the other of almost every organ of the body. I think it is folly to attribute success in these cases to any extraordinary powers of vitality in the patient. Surgeons have not looked sufficiently deep into the sources of this success. I apprehend it will be found somewhere in the very first management of the case. Vital depression in such injuries may be so great as to destroy life, without reaction occurring at all, or from the very commencement of the latter, pain so intense may set in as to arrest its progress, and rapidly exhaust what little remains of vitality, or the general reaction may be as yet hardly perceptible, and the local, not excessive yet from its irregular and spasmodic character, more than the injured part can bear. If anything can be done here it must be done instanter, or irreparable mischief will occur before we can expect to arrest it. If we have missed the point, at which perhaps it might have been reduced to control, and have allowed reaction to be more fully established, inflammation once set up may go on rapidly to the destruction of life. To use a simile, if you would dam up the stream, do it while the waters are low; await the floods coming on and they will sweep away you and your work together.

Considering then that in the shock of an injury, we have a morbid depression of the organic nervous system paralyzing the very main springs of vital action, and consequently of reparative action, and that until the tone of the organic nervous system is restored and its healthy influence re-established, reaction, or renewed vital manifestations, will be irregular and tumultuous and inefficient for healthy reparation; hence the great value of opium at once as a nervous stimulant and sedative and equaliser of nervous and arterial action;—that when the organic nervous system has recovered its normal status the general equilibrium of the vital forces will be restored and the system placed in the best possible state for the exertion of reparative effort;—that by the time the equilibrium is restored the system will have become accustomed to and tolerant of the morbid impression and that the worst dangers of reaction will have passed over not to

return. I am led by the evidence above afforded to the following conclusions:

1st. That when by the shock of a severe injury, especially if accompanied by excessive hœmorrhage, the powers of life are reduced to the lowest ebb, the patient may frequently be rallied, when all other remedies are of no avail, by the stimulating and reviving powers of opium, administered at short intervals in moderately full doses of from one to two grains, or of laudanum in drachm doses or more.

2nd. That the prostrated and ex-sanguine state of the system establish a full tolerance of the drug in proportion to their extent.

3rd. That in proportion as the vital powers are less reduced, the administration of opium during the shock becomes unnecessary and will be fraught with more danger, and that it will be proper, therefore, to rely in part or wholly on other measures in ordinary use, such as warmth, friction, diffusible stimuli, &c., according to the circumstances of the case.

4th. That when reaction is indicated by returning sensation and pain, opium is an invaluable agent for controlling it, and preventing its excess, regard being had to the conditions under which a tolerance of it is established.

5th. That when by general prostration induced by the severity of the injury, or by previous hœmorrhage or by venesection, tolerance of opium has been established, the allaying of pain may serve as a guide as to the extent to which it shall be given and that it may then be safely carried to any extent necessary to accomplish that result, inasmuch as by its effect on the sensitive nervous system, we are able to estimate and gauge its influence on the organic; and that farther the system should be kept under its influence until the reactionary dangers are past by re-administering it as often as the recurrence of severe pain renders it necessary.

6th. That by its powers of rallying and supporting the nervous energy, allaying irritation, freeing and equalizing the circulation and keeping it within bounds, the system is placed in the best possible state for the healthy exertion of the reparative process.

7th. That as soon as this has been established in a healthy man-

ner, the opiate may be gradually withdrawn and the case treated on general and established principles, according to the phases it may assume.

8th. That in proportion as reaction has advanced and inflammation and constitutional irritation have set in, the free use of opium will be contra-indicated, unless the inflammation be previously removed by bleeding.

It may be a question as to how far the above will apply in cases of injury of the brain. If the dangers of narcotism are in an inverse ratio to the extent of the vital depression, and if opium really possess the property of freeing the capillary system, as well as equalising and controlling the general circulation, then I see no reason why it should not operate as favorably in brain lesions as in any other class of cases.

I should hardly have presumed to argue so important a subject upon experience as limited as my own, where cases of great emergency are few and far between, did I not feel for that very reason the want of more light and guidance in this matter than we at present possess. To judge by the books, one might think all we have to do is to endeavor to bring on reaction, no matter how we succeed, then follow symptoms as they arrive. I believe that a far deeper importance attaches to these first few hours of treatment, and that the whole future progress of the case, with its issues of life and death, will be greatly modified and controlled by the manner in which we grapple with the shock and early reaction, simply as such, regarding them both merely as manifestations of a disturbed condition of the organic nervous centres, thereby disarranging the balance of the whole system; the more favorably we can operate, therefore, on the organic nervous system and the nearer we can approach to restoring and maintaining its normal status and equable influence the more efficiently will reparation be carried on, the less will be the irregularity or excess of local action, the less will be the subsequent dangers besetting our path. The question has long arisen in my mind whether we may not accomplish more than has hitherto been done, and whether we cannot from the detached experiences of writers in various departments, deduce some great and simple guiding rules at once for the promotion and control of reaction, thereby preventing many dangers now considered necessary consequences of the injury. How-

ever far I may have fallen short in approaching a solution of the problem, still I trust that it will not have been brought before the eminent gentlemen around me in vain. If in the hands of the obstetric physician, patients almost in articulo mortis from the combined effects of exhausting labor, severe flooding and laceration of important internal organs, can by opium be rallied and saved, what should prevent the surgeon from accomplishing as much by the same means in a case, for instance, where both legs have been crushed, where the hœmorrhage, though excessive, has yet not been sufficient wholly to sink the patient, and where sufficient vitality remains to admit of several hours of reactionary suffering ere death steps in to his relief. If we cannot effect as much, let the reason why be understood; if farther investigation should prove that we can, then let the results be laid down in rules as definite as possible, both as to the conditions under which we may safely employ it, and the extent to which we may safely carry it; what we can accomplish with it and what we may and may not expect from it.

In conclusion, if the question I asked at the commencement of this article can be determined, as I trust, and as there is reason to think it may, great would be the advantages to patient and medical attendant alike. Not only would the safety of many an one, now lost after great and exhausting operations, be secured; not only might the energies of the almost expiring victim of the battle-field or railroad track, wherever indeed we have organised help, be rallied and sustained until other measures could be taken for his relief; but we should be enabled to step forward in cases of casualty, where the miseries of a lifetime appear to be crowded into a few short hours of agony, and adopt bold measures calculated as much to avert future dangers as to allay present suffering; moreover, by the prevention of such dangers, it would often be placed in the power of any practitioner of ordinary judgment and ability, though, perhaps, of limited experience to command success in cases, which now tax in vain the skill and ingenuity, indeed all the resources of the most accomplished practical surgeons.

Yonkers, March, 1863.